Supporting Information

Supplementary figures and tables.

Enhanced Performance of $LiAl_{0.1}Mn_{1.9}O_4$ Cathode for Li-ion Battery via TiN Coating

Pinelopi Angelopoulou[1,2], Spyros Kassavetis[3], Joan Papavasiliou[1], Dimitris Karfaridis[3], Grzegorz Słowik[4], Panos Patsalas[3], George Avgouropoulos[1,z]

[1]Department of Materials Science, University of Patras, GR-26504 Rio Patras, Greece

[2]Foundation for Research and Technology-Hellas (FORTH), Institute of Chemical Engineering Sciences (ICE-HT), P.O. Box 1414, GR-26504 Patras, Greece

[3]Department of Physics, Aristotle University of Thessaloniki, GR-54124 Thessaloniki, Greece

[4]University of Maria Curie-Skłodowska, Faculty of Chemistry, Pl. M. Curie-Skłodowskiej 2, 20-031 Lublin, Poland

[z]*To whom correspondence should be addressed (e-mail: geoavg@upatras.gr)*

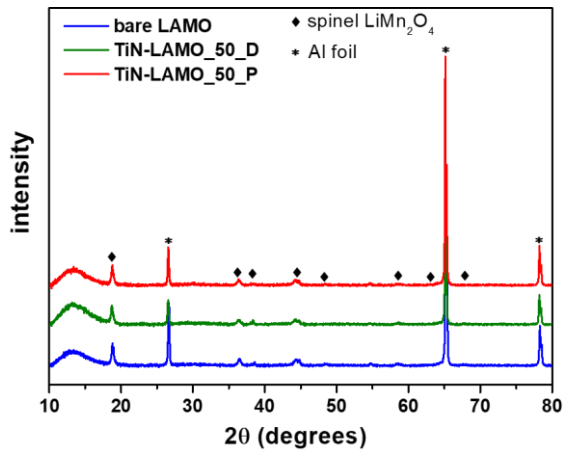

Figure S1. XRD patterns of the bare LAMO, TiN-LAMO_50_D and TiN-LAMO_50_P electrodes.

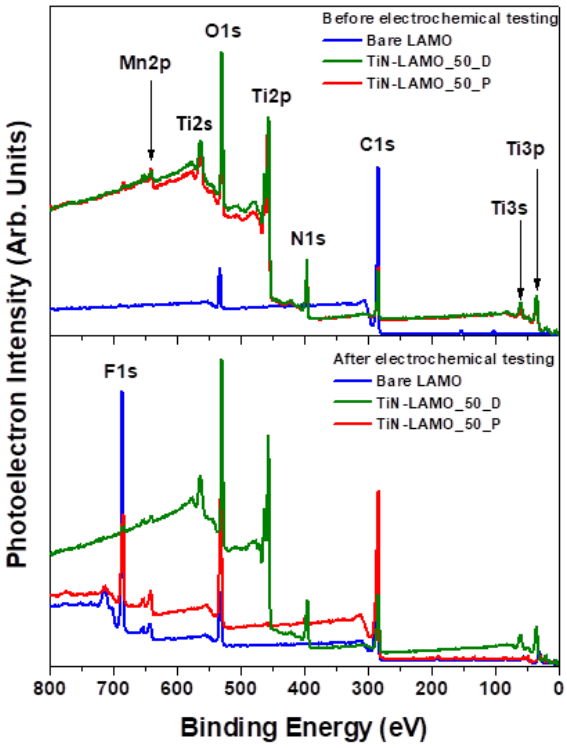

Figure S2. XPS wide scan spectra for bare LAMO, TiN-LAMO_50_D and TiN-LAMO_50_P before (upper panel) and after (lower panel) electrochemical testing.

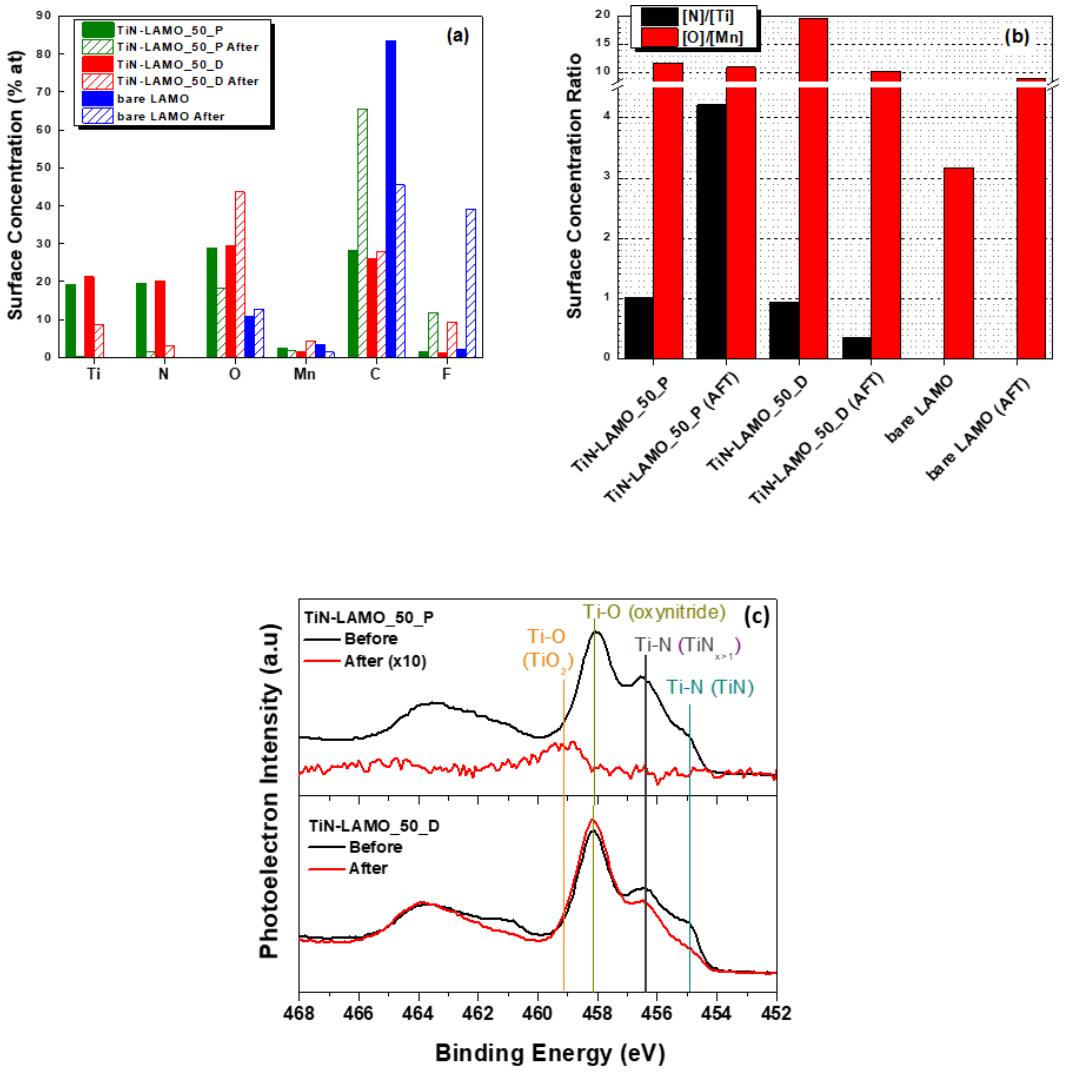

Figure S3. (a) The surface elemental composition of the studied samples before and after electrochemical testing, as extracted from XPS wide scan spectra taking into account the corresponding sensitivity factors and (b) the ratios of the [N]/[Ti] and [O]/[Mn] surface compositions showing that the as grown samples are almost equiatomic TiN and LAMO with O-rich surfaces, (c) Ti2$p_{3/2}$ core level spectra of the two TiN-coated samples before and after electrochemical testing. The reference lines (based on Ref. 53-54,57-59) of various Ti-based phases are indicated by coloured vertical lines.

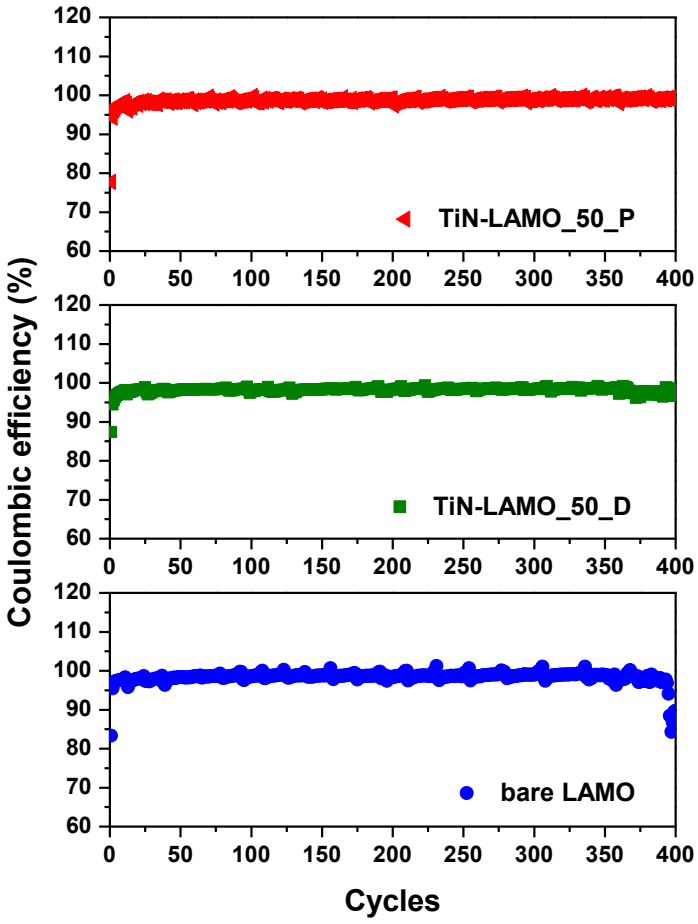

Figure S4. Coulombic efficiency of bare LAMO, TiN-LAMO_50_D and TiN-LAMO_50_P during cycling.

Table S1. Fit results of EIS for the cathode electrodes after the 200th and 400th discharge step at 3.0 V.

	200th cycle			**400th cycle**		
Sample	**R_{Ohm} (Ω)**	**R_f (Ω)**	**R_{ct} (Ω)**	**R_{Ohm} (Ω)**	**R_f (Ω)**	**R_{ct} (Ω)**
Bare LAMO	6.3	202.7	238.3	7.5	304.7	240.3
TiN-LAMO_50_D	9.9	118.7	27.7	11.9	129.1	31.5
TiN-LAMO_50_P	8.8	174.6	124.2	11.0	235.7	164.3

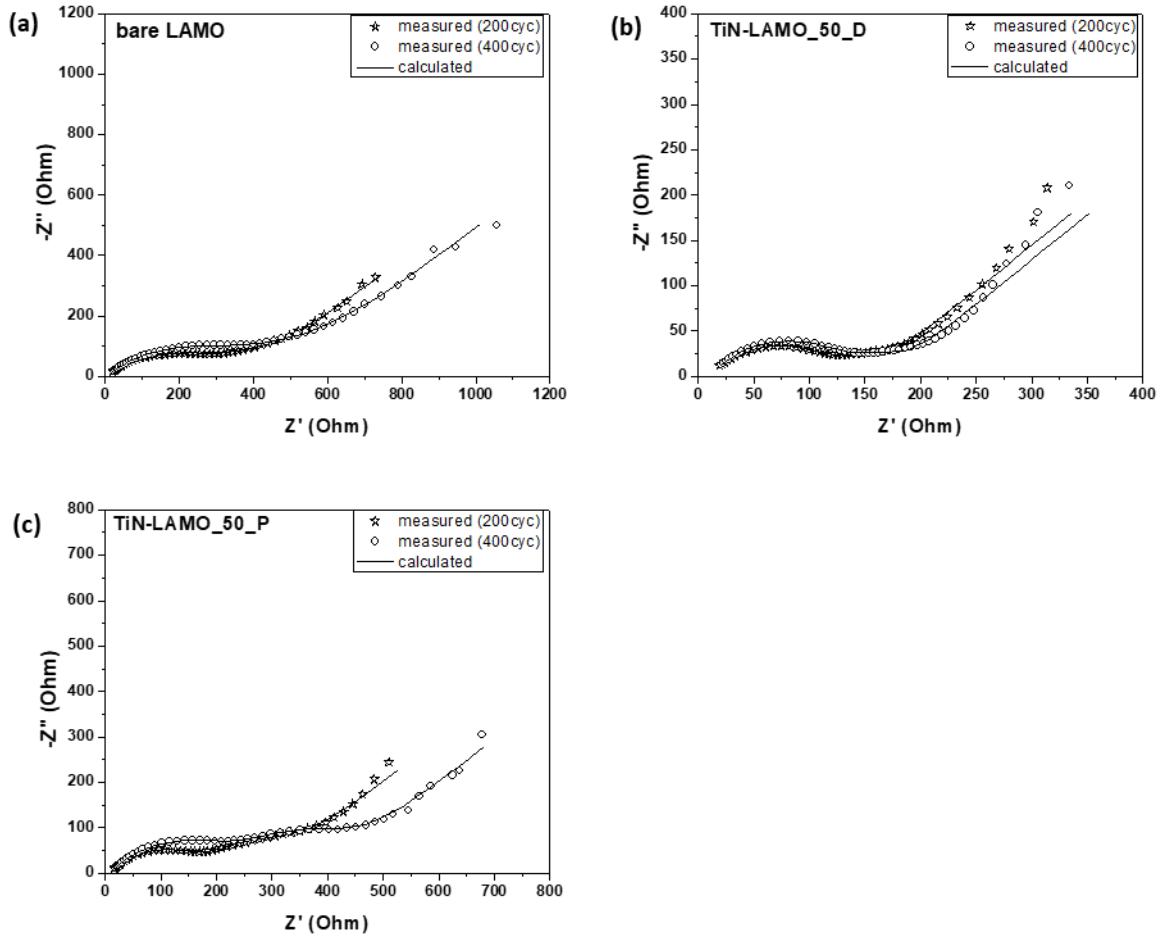

Figure S5. EIS fitting curves of the (a) bare LAMO, (b) TiN-LAMO_50_D and (c) TiN-LAMO_50_P electrodes after 200 and 400 cycles.

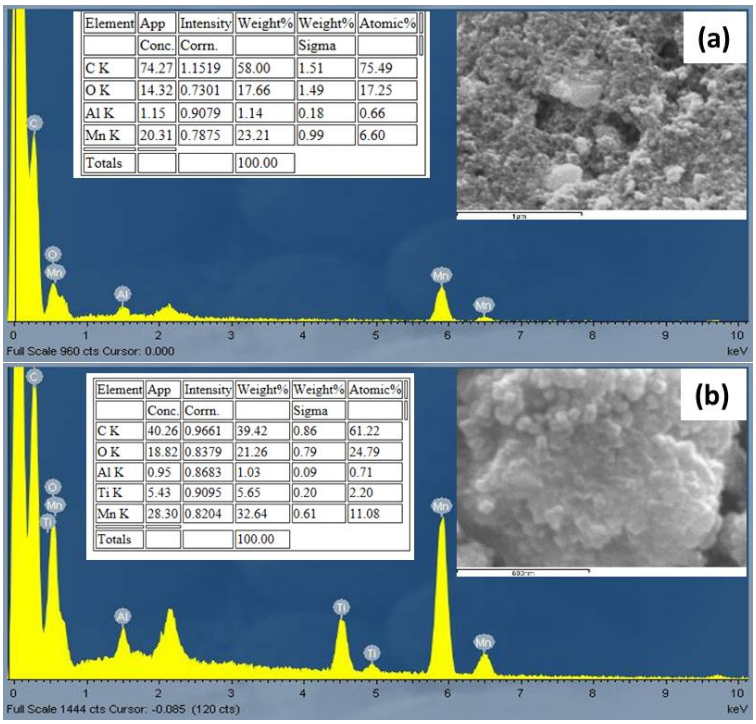

Figure S6. EDS analysis of the inset SEM image of (a) bare LAMO and (b) TiN-LAMO_50_D electrode, after long-term operation of 400 cycles.